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wardly sloping first guide hole H1 may delay the rotation of the second link L2 for a certain period of time and prevent or substantially prevent abrupt folding of the foldable display device 10. The generation of stress in the flexible display panel 100 due to the abrupt folding of the display device 10 and the initial interference that causes the flexible display panel 100 and the hinge part 113 to instantaneously contact each other may be reduced or prevented. That is, the durability of the foldable display device 10 according to the current embodiment may be improved (e.g., increased).

Embodiments of the present invention provide at least one of the following features.

It is possible to reduce or prevent the damage to a flexible display panel by reducing stress of the flexible display panel. In addition, it is possible to increase durability of a foldable display device.

However, the effects of the present invention are not restricted to the one set forth herein. The above and other effects of the present invention will become more apparent to one of daily skill in the art to which the present invention pertains by referencing the claims.

It will be understood that, although the terms “first”, “second”, “third”, etc., may be used herein to describe various elements, components, regions, layers and/or sections, these elements, components, regions, layers and/or sections should not be limited by these terms. These terms are used to distinguish one element, component, region, layer or section from another element, component, region, layer or section. Thus, a first element, component, region, layer or section discussed below could be termed a second element, component, region, layer or section, without departing from the spirit and scope of the inventive concept.

Spatially relative terms, such as “lower” and “upper” and the like, may be used herein for ease of description to describe one element or feature’s relationship to another element(s) or feature(s) as illustrated in the figures. It will be understood that the spatially relative terms are intended to encompass different orientations of the device in use or in operation, in addition to the orientation depicted in the figures. The device may be otherwise oriented (e.g., rotated 90 degrees or at other orientations) and the spatially relative descriptors used herein should be interpreted accordingly. In addition, it will also be understood that when a layer is referred to as being “between” two layers, it can be the only layer between the two layers, or one or more intervening layers may also be present.

The terminology used herein is for the purpose of describing particular embodiments and is not intended to be limiting of the inventive concept. As used herein, the singular forms “a” and “an” are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms “include,” “including,” “comprises,” and/or “comprising,” when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof. As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed items. Expressions such as “at least one of,” when preceding a list of elements, modify the entire list of elements and do not modify the individual elements of the list. Further, the use of “may” when describing embodiments of the inventive concept refers to “one or more embodiments of the inventive concept.” Also, the term “exemplary” is intended to refer to an example or illustration.

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It will be understood that when an element or layer is referred to as being “on”, “connected to”, “coupled to”, or “adjacent to” another element or layer, it can be directly on, connected to, coupled to, or adjacent to the other element or layer, or one or more intervening elements or layers may be present. When an element or layer is referred to as being “directly on,” “directly connected to,” “directly coupled to”, or “immediately adjacent to” another element or layer, there are no intervening elements or layers present.

As used herein, the term “substantially,” “about,” and similar terms are used as terms of approximation and not as terms of degree, and are intended to account for the inherent variations in measured or calculated values that would be recognized by those of ordinary skill in the art.

As used herein, the terms “use,” “using,” and “used” may be considered synonymous with the terms “utilize,” “utilizing,” and “utilized,” respectively.

Although the exemplary embodiments of the present invention have been disclosed for illustrative purposes, the embodiments are only exemplary, but do not limit the present invention. Those skilled in the art will appreciate that various suitable modifications and applications are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims. For example, each element specified in embodiments of the present invention may be variously modified and implemented. Further, differences related to such modifications and applications should be interpreted as being included in the scope of the present invention defined by the accompanying claims, and equivalents thereof.

What is claimed is:

1. A foldable display device comprising:

a flexible display panel comprising a bendable area and flat areas on both sides of the bendable area; and
a lower case housing the flexible display panel and comprising:

a hinge corresponding to the bendable area and comprising a first rotation point connected to a first link having a first radius of rotation and a second rotation point connected to a second link having a second radius of rotation, the second radius of rotation being different from the first radius of rotation; and supports on both sides of the hinge and corresponding to the flat areas, wherein the first link has an end connected to the first rotation point and a first guide opening connected to each of the supports, and the second link has a first end connected to the second rotation point and a second end engaging the first guide opening.

2. The foldable display device of claim 1,

wherein each of the supports comprises a support plate configured to support the flexible display panel, a bottom portion opposite the support plate, and sidewalls extending from both sides of the bottom portion and perpendicular to the support plate, and

wherein each of the sidewalls comprises a second guide opening extending in a different direction from the first guide opening, and the second end of the second link engages the second guide opening.

3. The foldable display device of claim 2, wherein each of the sidewalls comprises a first moving protrusion configured to move along the first guide opening, and the second end of the second link comprises a second moving protrusion configured to move along the first guide opening and the second guide opening.

4. The foldable display device of claim 3, wherein at least part of the first guide opening comprises a region extending